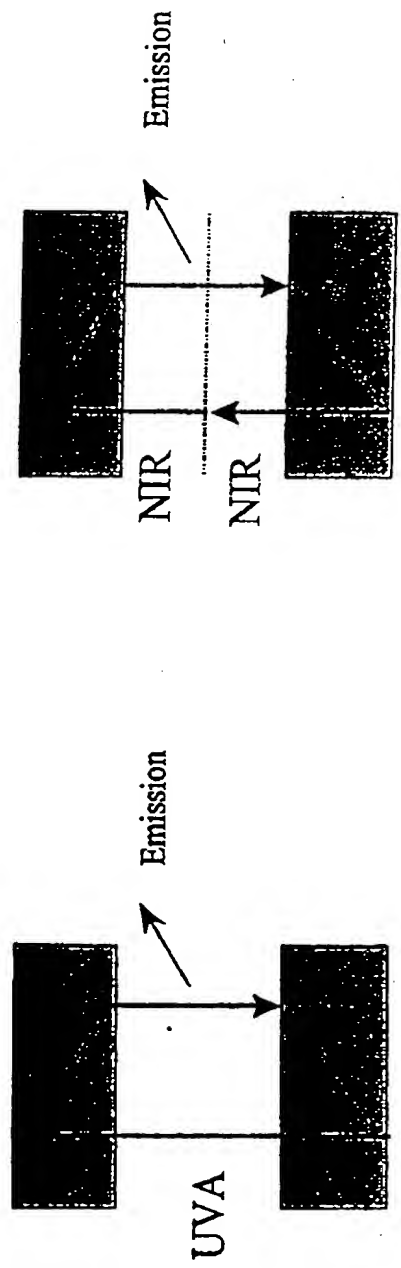


Figure 1: Schematic diagram of a photonic device showing energy levels and transitions.



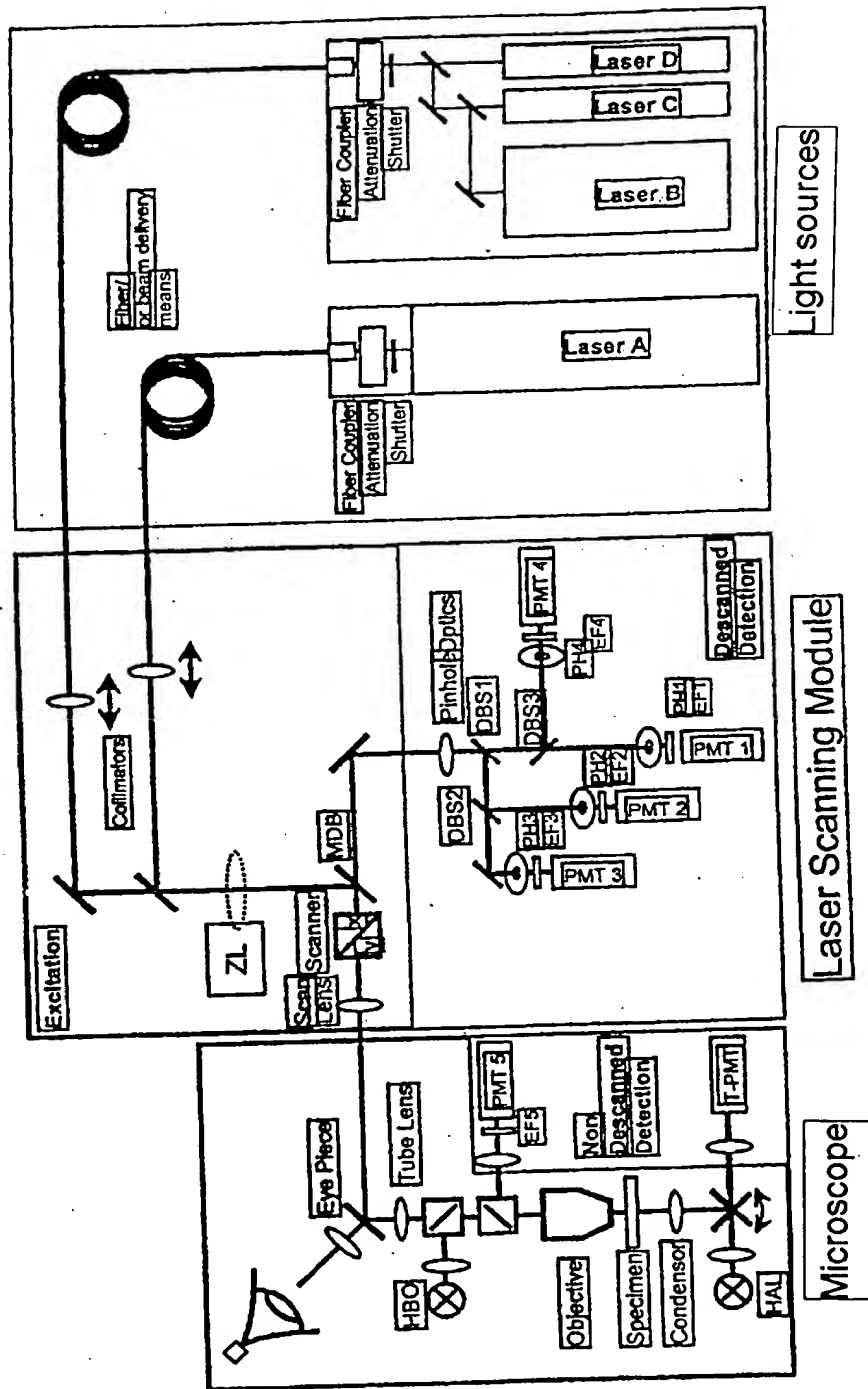
a.)

a) Single-photon absorption

b.)

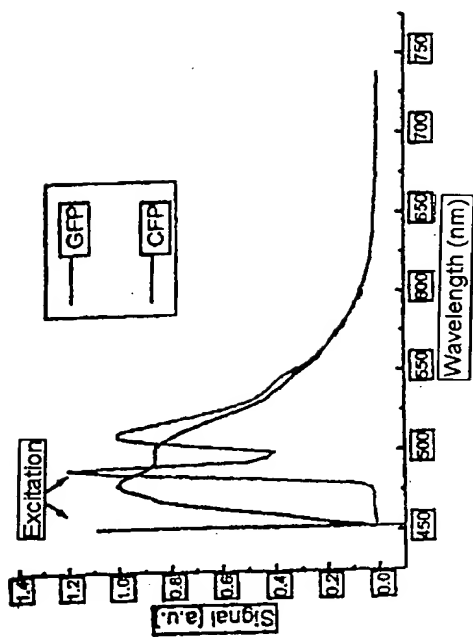
b) Multiphoton absorption

Figure 1:

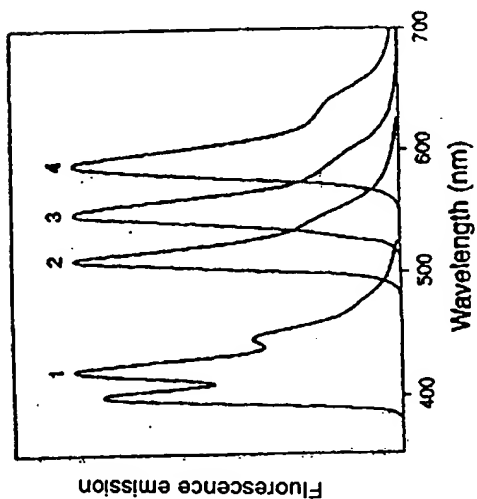


LSM construction (prior art)

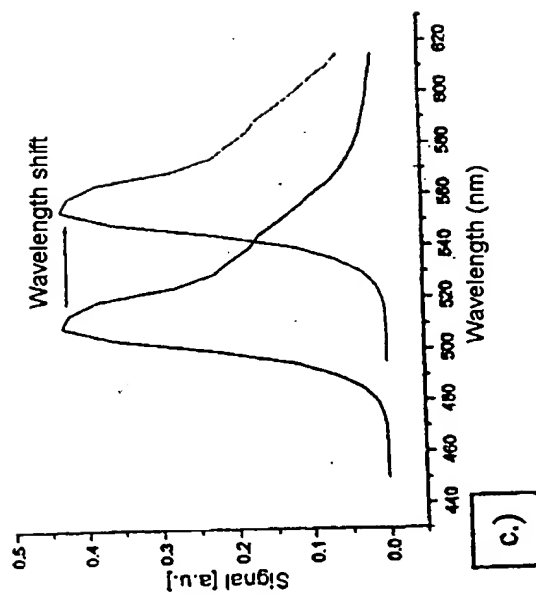
Figure: 2



b.)



a.)



c.)

Typical spectra a) Dyes, b) fluorescent proteins
c) wavelength shift as a function of environment, d) FRET

Figure: 3

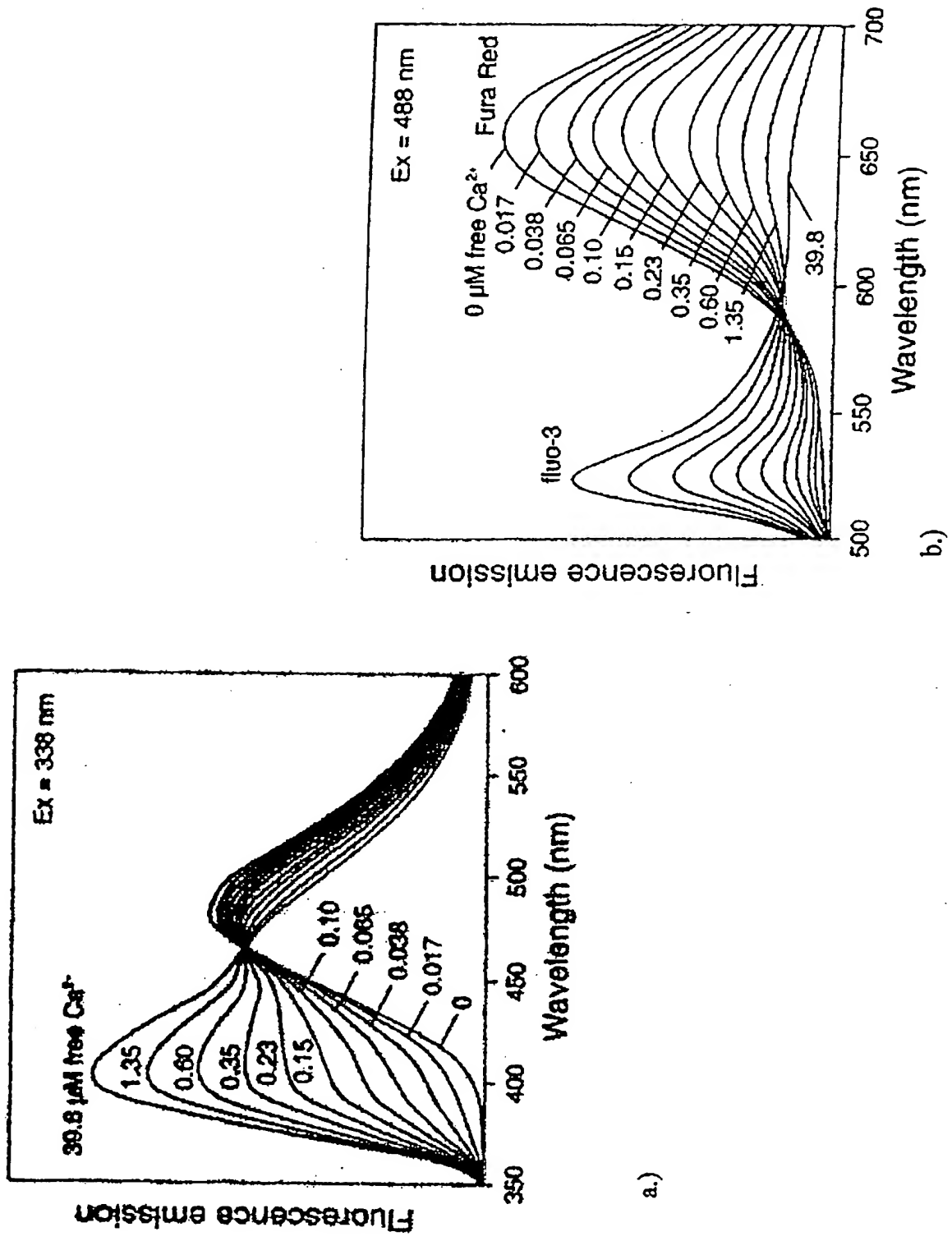
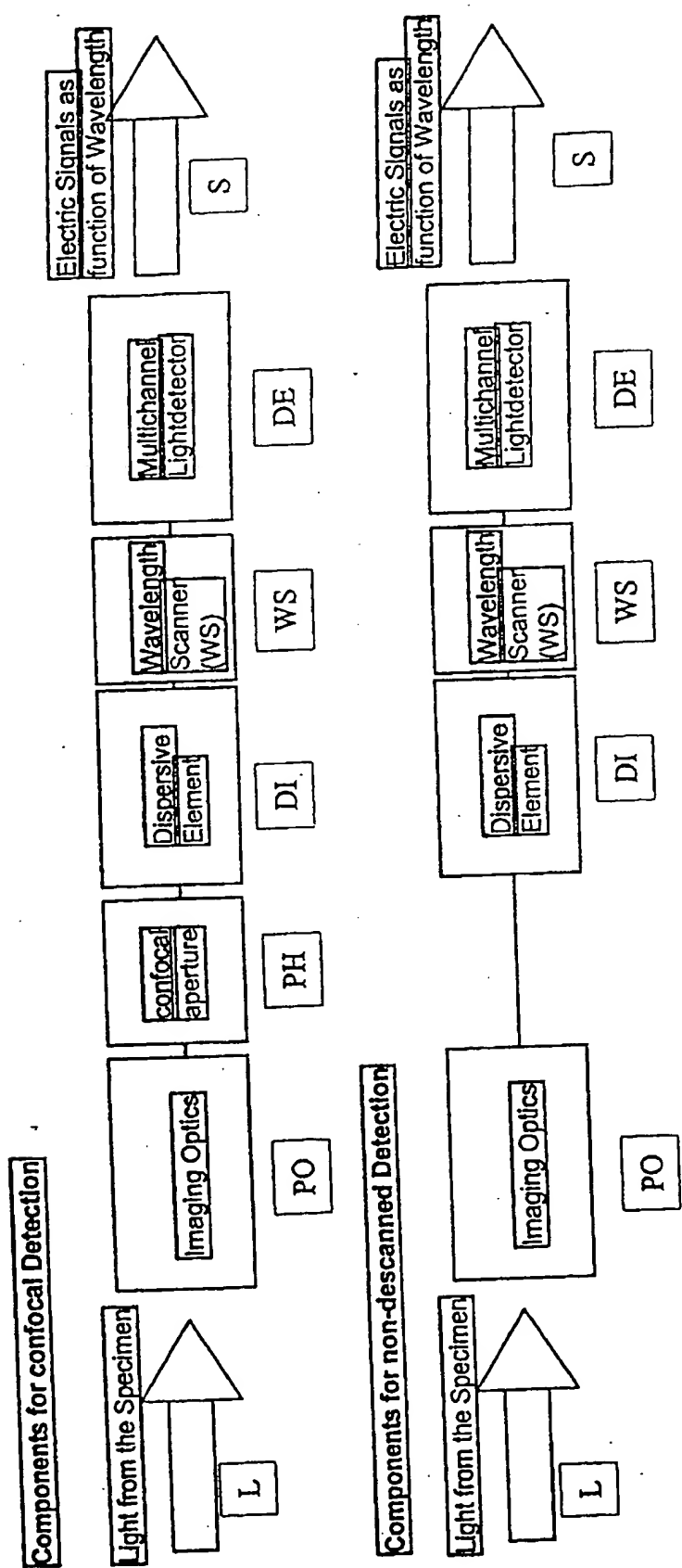


Figure: 4

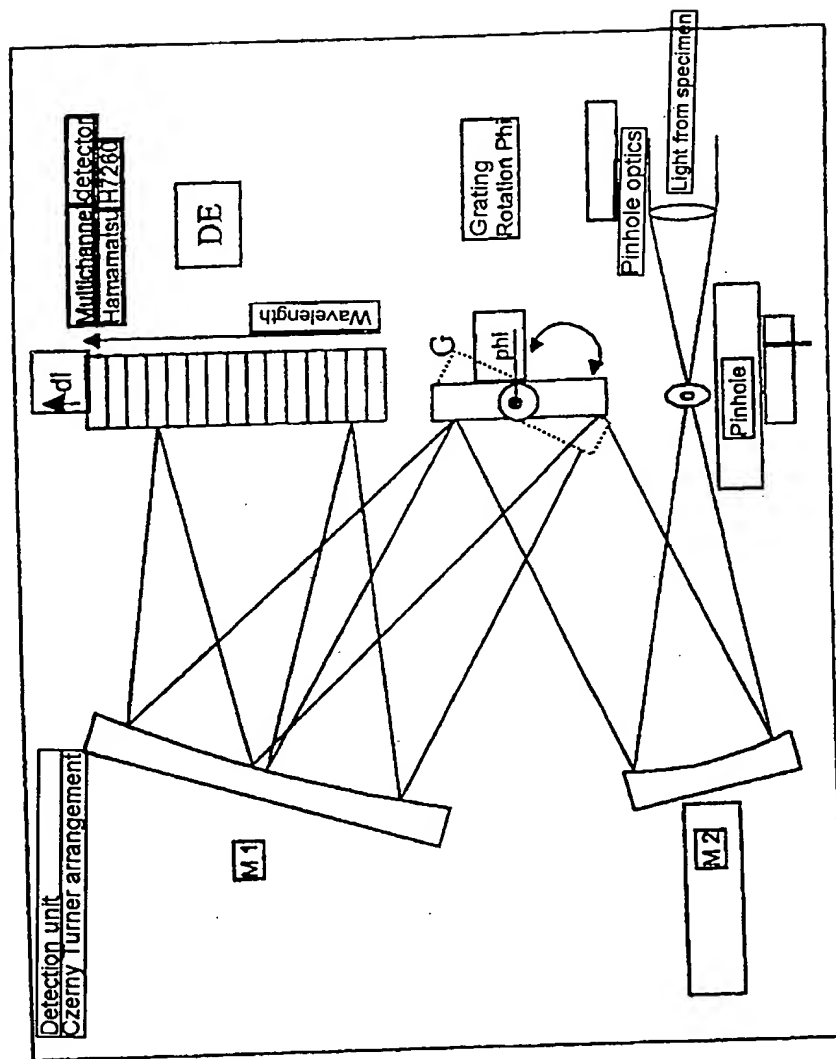
Typical spectra with ratiometric measurements

a) a dye with emission ratio; b) two dyes with ion-dependent signals



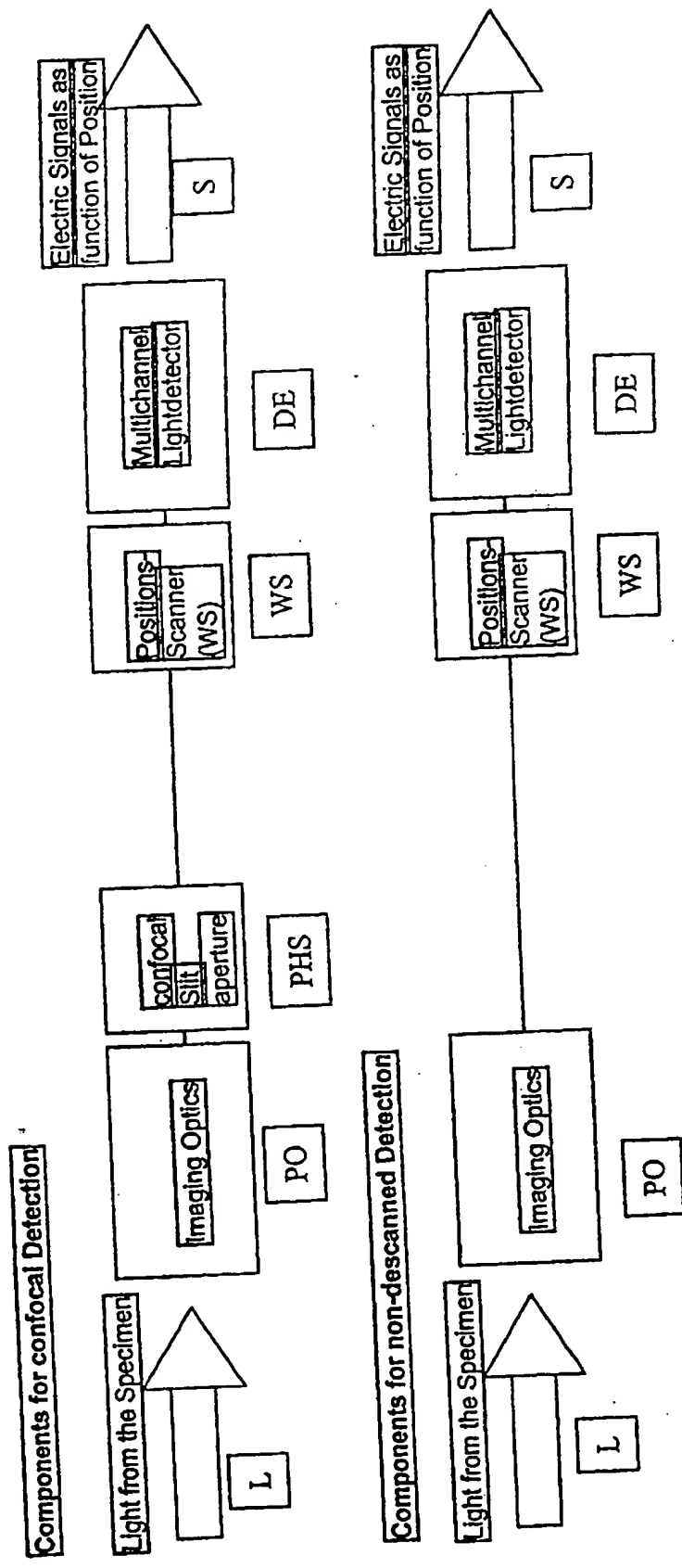
Block diagram of detector-optics construction

Figure: 5



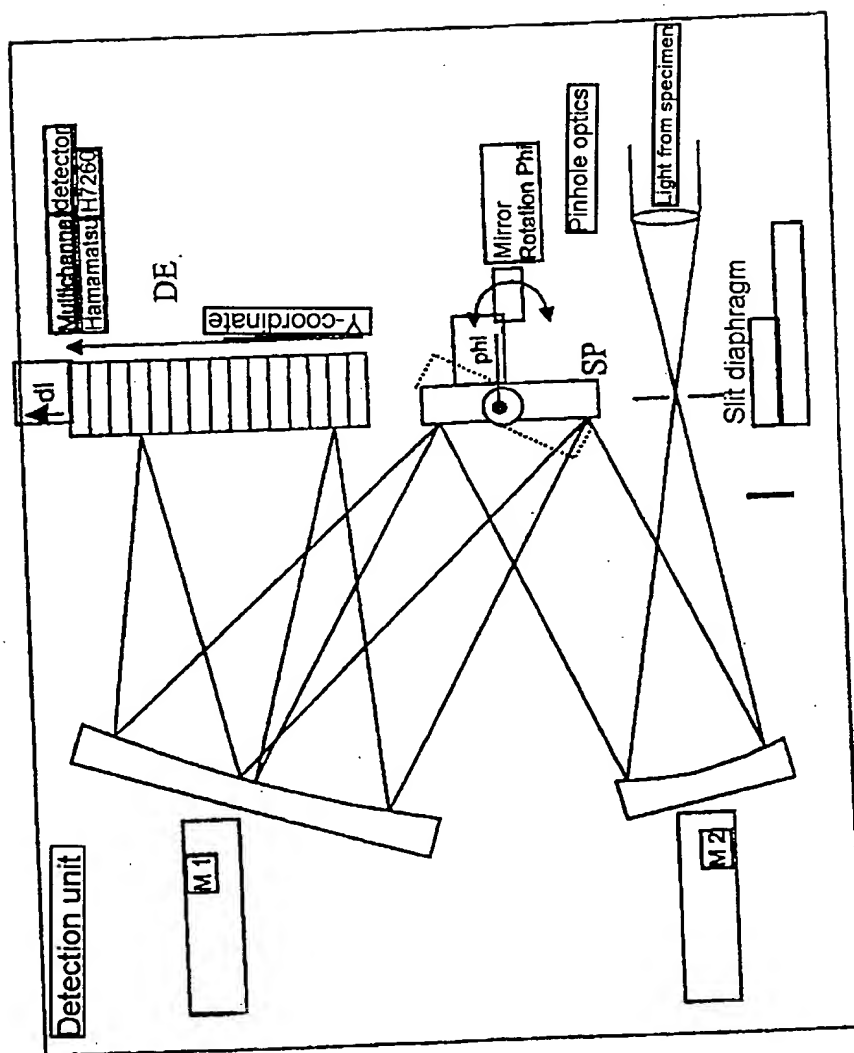
Example of detector unit/optics construction

Figure: 6



Block diagram of detector unit/optics construction for line scanner

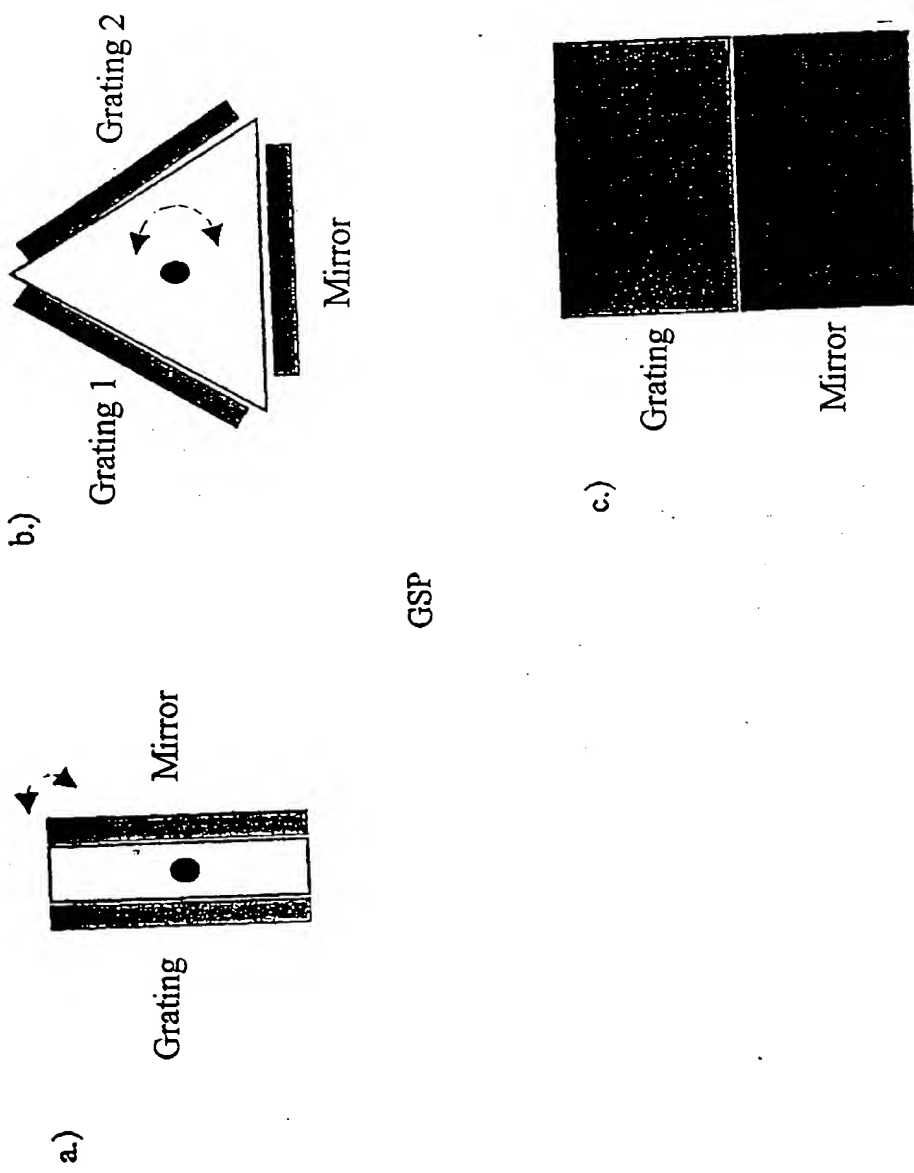
Figure: 7



Example of detector unit/optics construction for line scanner

Figure: 8

Figure 9 shows three different switching elements. (a) is a simple grating and mirror. (b) is a more complex structure with two gratings and a mirror. (c) is a structure with a grating and a mirror, but with a different internal configuration.



GSP

Switching elements

Figure: 9

The diagram illustrates the shift operation in the proposed algorithm. It shows a set of individual channels, $C_{1,n}, C_{2,n-1}, \dots, C_{1,n-1}, \dots, C_{1,0}$, which are shifted to produce spectral components $S(mN), \dots, S(0)$. A large arrow labeled "Algorithm" points from the channels to the spectral components.

Algorithm Pixelshift (top) and calculated sub-pixels (bottom)

Figure: 10

Figure 11 shows the relationship between the quantity of shifts n and the detector resolution. The curves show that as the quantity of shifts increases, the detector resolution decreases, approaching a desired pixel resolution.

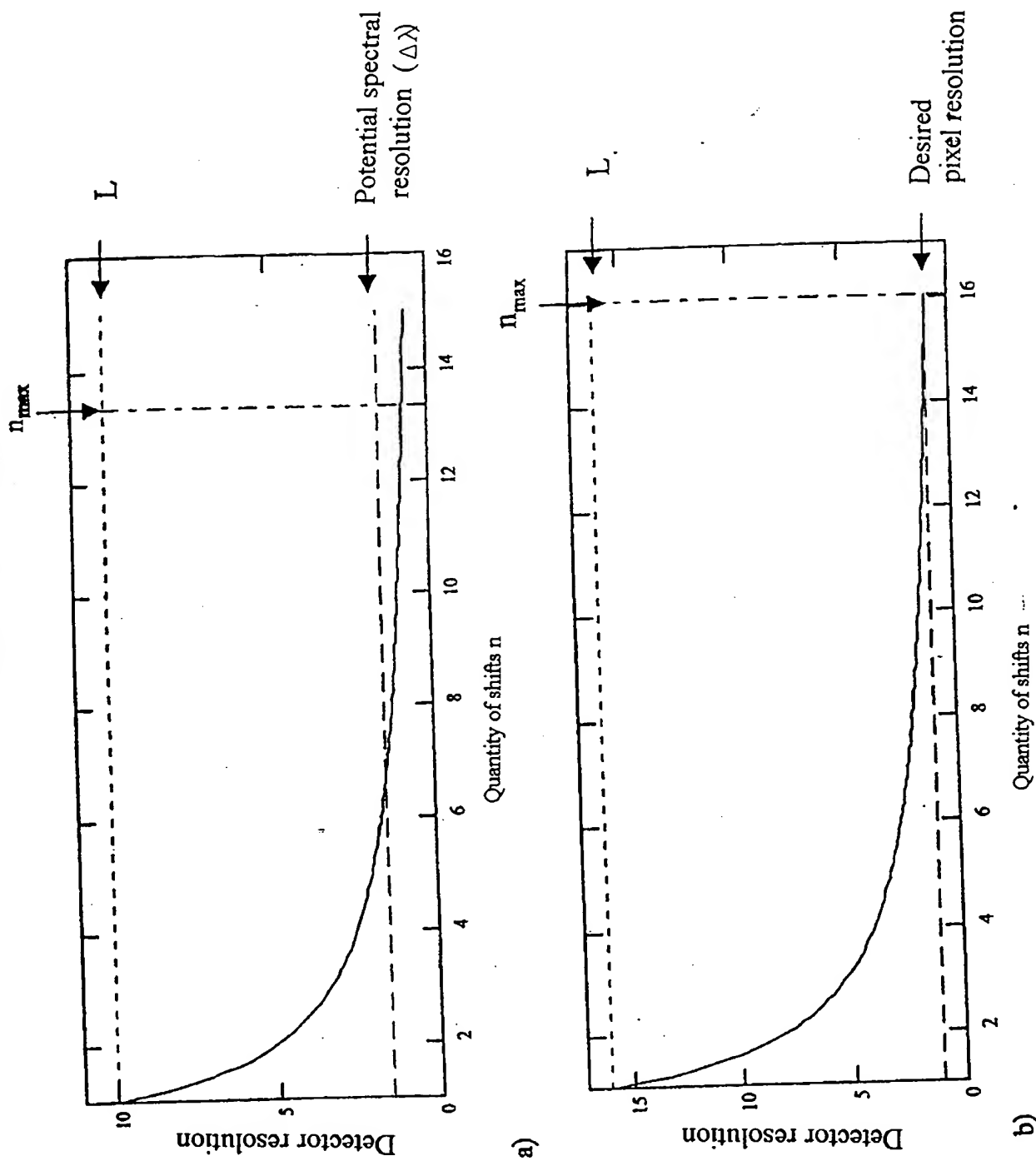
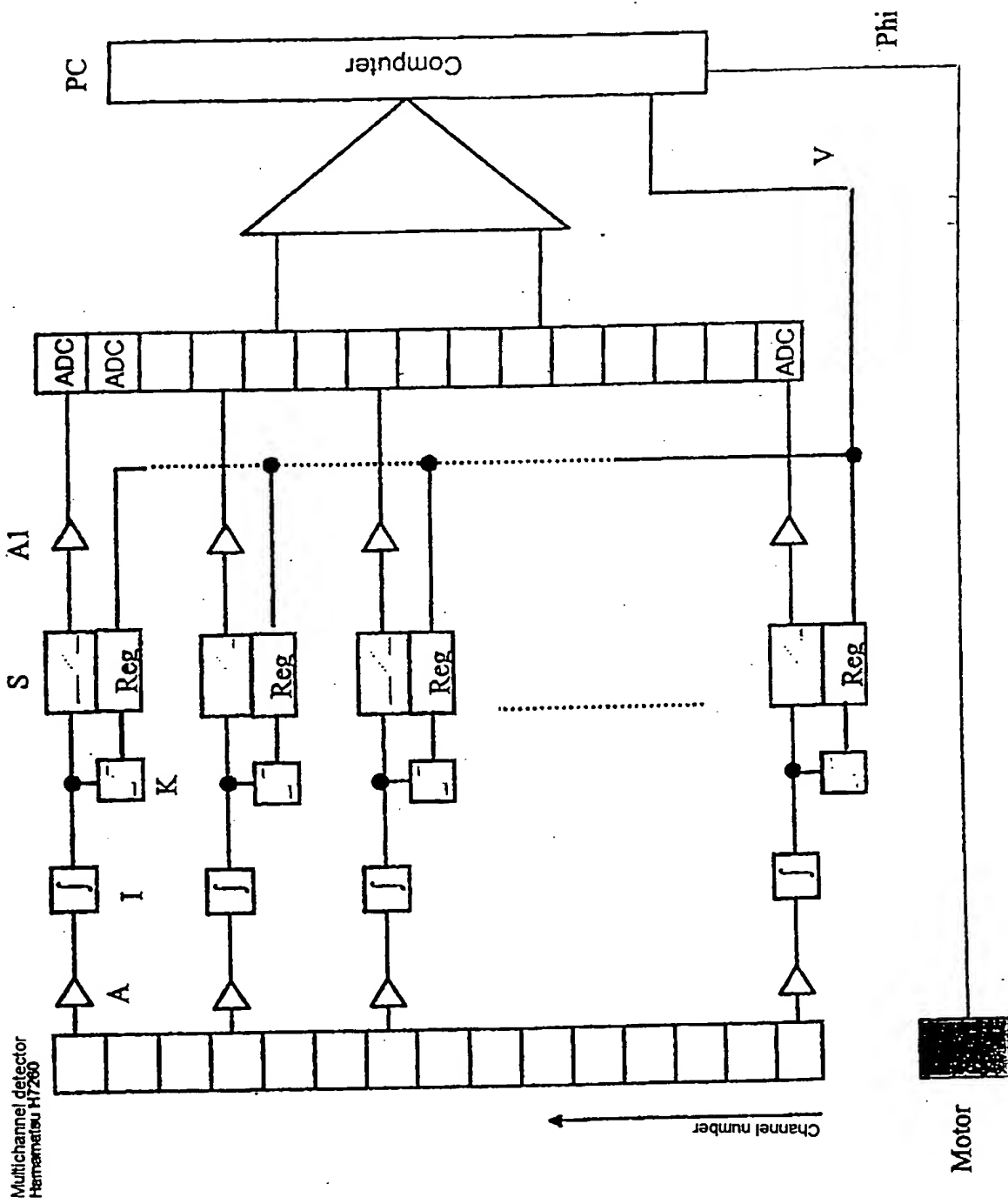


Figure: 11

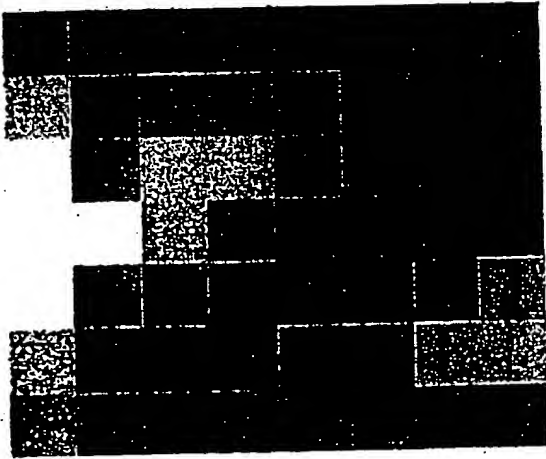


Example for construction of electronics

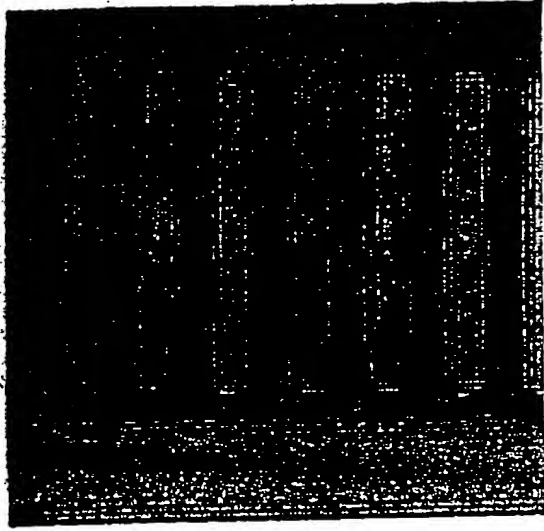
Figure: 12

1.) 2.)

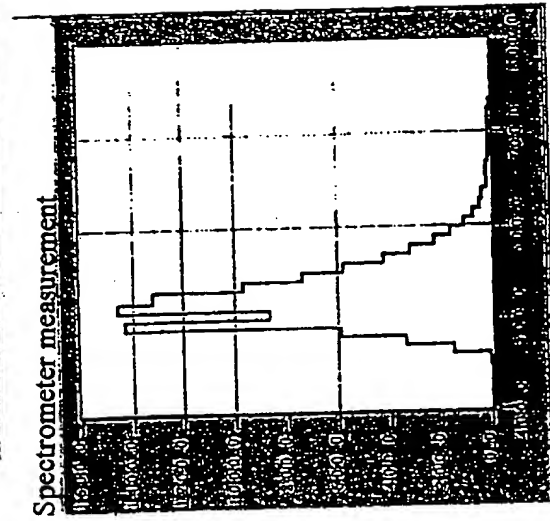
1.)



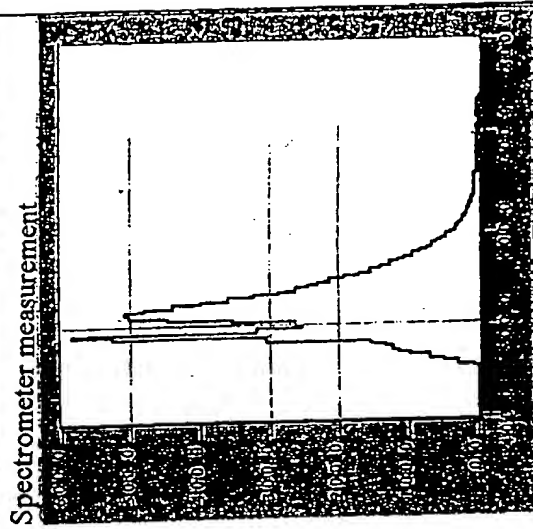
b.)



2.)



a.)



A.) Spectrum example. B.) Image example

Figure: 13